

Remarks

Claims 11-20 are pending. Claims 11, 19 and 20 have been amended.

Support for the amendment of claim 11 can be found in [0029]. No new matter has been added.

Reconsideration of the application is requested.

Upon review of the file, it was noted that the initialed Form PTO-1449 filed with the Information Disclosure Statement dated December 19, 2008 has not been received. It is requested that the Examiner initial the Form PTO-1449, a copy of which is enclosed for the Examiner's convenience, and return it to the undersigned attorney.

§ 101 Rejections

Claims 19 and 20 are rejection under 35 USC § 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 USC 101.

Applicant has amended claims 19 and 20 to recite an article that includes the heat conductive foam sheet.

The rejection of claims 19 and 20 under 35 USC § 101 has been overcome and should be withdrawn.

§ 112 Rejections

Claims 19 and 20 are rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Applicant has amended claims 19 and 20 to recite an article that includes the heat conductive foam sheet.

The rejection of claims 19 and 20 under 35 USC § 112, second paragraph, has been overcome and should be withdrawn.

§ 103 Rejections

Claims 11-20 are rejected under 35 USC § 103(a) as being unpatentable over Fischer et al. (US 2004/0241417 referred to herein as “Fischer”) in view of Yang et al. (US 6,841,612 referred to herein as “Yang”).

In summary, the Office Action states the following (with citations omitted):

Fischer teaches a foam interface material (FIM) which may be prepared in the form of a sheet. The foam material comprises a thermally/heat conductive filler and a hot melt PSA . . . A foaming agent is also used to prepare the foam.

Fischer teaches the PSA may contain free radical initiators but does not expressly teach that they are heat polymerization initiators. However, Yan also teach acrylic polymers prepared using free-radical initiators, specifically peroxy and hydroperoxy initiators. Examples of such initiators include benzoyl peroxide and lauroyl peroxide, both of which are indicated in the instant specification on page 7 to be useful as heat polymerization initiators. . . . At the time of invention, it would have been obvious . . . to use a peroxy initiator in the PSA taught by Fischer. The motivation would have been that presence of the peroxy initiators would initiate the thermal polymerization of acrylates, supplementing the UV polymerization originally taught by Fischer. The thermal polymerization of acrylates is less costly and requires less process modification than UV polymerization.

Applicant traverses the rejection for the following reasons.

Fischer discloses a foam interface material (TIM) comprising thermally conductive filler (TCF) and a hot melt PSA polymer foam. Suitable materials for producing the hot melt PSA include (meth)acrylate polymers. [0039]. Suitable thermally conductive fillers have a bulk density of 5 to 1000 Watts/meter-K as measured according to ASTM D1530. [0043]. Useful foaming agents include entrained gases/high pressure injectable gases, blowing agents (such as chemical blowing agents and physical blowing agents), expanded or unexpanded polymeric bubbles, and combinations thereof. [0050].

Fischer describes the extrusion process for making the foam TIM in Fig. 4 and in Examples 1-9. In brief summary, a hot melt PSA polymer is fed into a first extruder 310. [0066]. Next, the thermally conductive filler (and other additives with the exception of expandable microspheres, if used) are fed to a second extruder 312. Once combined, the hot melt PSA polymer, the TCF and additives are well mixed in extruder 312. [0067]. The expandable polymeric microspheres may be added to the second extruder 312, typically in a separate zone at downstream entrance 313. The purpose of the melt-mixing is to prepare an expandable

extrudable composition in which the TCF, microspheres and other additives, if present, are distributed throughout the molten polymer. [0068]. Following melt-mixing, the expandable, extrudable composition is metered into extrusion die 314 through transfer tubing 318. The temperature within the die 314 is at or above the temperature required to cause expansion of the expandable microspheres. [0069].

In Examples 1-6, in preparing the hot melt PSA-A, Fischer uses IRACURE 651, which is a photoinitiator. The hot melt PSA composition was “exposed to UV radiation” to increase the solution viscosity. [0145]. In Examples 7-9, Fischer also used the same photoinitiator to produce PSA-B. After the hot melt PSAs A and B were made, then the TIM was prepared generally as described above and in Fig. 4. As the Examiner noted, Fischer fails to explicitly disclose the use of heat polymerization initiator as recited in Applicant’s claim 1.

Yang discloses composite plastic compositions based on selected crosslinked polymers, having selected crosslinking levels and a selected particle size range, result in unexpectedly improved extrusion process performance and the ability to provide “granite-like” plastic articles as compared with prior art plastics using cell-casting processes. Col. 2, lines 50-55. Useful crosslinked polymers include, e.g., crosslinked vinyl polymers and crosslinked condensation polymers. Thermoset polymers represent one useful class of crosslinked polymers. Col. 3, lines 44-45, 50. A preferred class of monomers useful in preparing the crosslinked polymers are (meth)acrylic monomers, particularly (C₁ to C₂₂) alkyl (meth)acrylate monomers. Col. 4, lines 13-16. Suitable free-radical initiators include peroxy and hydroperoxy initiators. Col. 4, line 63-64.

Applicant submits that one skilled in the art would not use the free radical initiators of Yang in place of the photoinitiators of Fischer to make the hot melt PSA of Fischer because the hot melt PSA system of Fisher is designed for a photoinitiator.

Furthermore, Fischer requires polymerization of the hot melt PSA in one step and the foaming of the PSA (using blowing agents or expandable bubbles or microspheres) in a second and separate step, which differs from applicant’s invention, as amended. One advantage derived from the instant invention is the combination of the heat-polymerizable binder component and the heat polymerization initiator. Applicant stated “[t]he inability to add large amounts of heat

conductive filler has been a disadvantage for most methods of the prior art, but with the heat conductive sheet of the present invention, the sheet-forming composition can be kept in a relatively low viscosity state even when the heat conductive filler is present in a relatively large amount, thereby facilitating kneading and molding and rendering the production process easier.” [0027]. Neither Fischer nor Yang recognized the benefit of combining heat polymerization and foaming as disclosed by applicant.

The rejection of claims 11-20 under 35 USC § 103(a) as being unpatentable over Fischer et al. in view of Yang et al. has been overcome and should be withdrawn.

In view of the above, it is submitted that the application is in condition for allowance.

Examination and reconsideration of the application as amended is requested.

Respectfully submitted,

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